



US006614874B2

(12) **United States Patent**  
**Avinash**

(10) **Patent No.:** **US 6,614,874 B2**  
(45) **Date of Patent:** **Sep. 2, 2003**

(54) **ROBUST AND EFFICIENT  
DECOMPOSITION ALGORITHM FOR  
DIGITAL X-RAY DE IMAGING**

(75) **Inventor:** **Gopal B. Avinash, New Berlin, WI  
(US)**

(73) **Assignee:** **GE Medical Systems Global  
Technology Company, LLC,  
Waukesha, WI (US)**

(\*) **Notice:** Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **10/058,615**

(22) **Filed:** **Jan. 28, 2002**

(65) **Prior Publication Data**

US 2003/0147497 A1 Aug. 7, 2003

(51) **Int. Cl.<sup>7</sup>** ..... **G01N 23/087**

(52) **U.S. Cl.** ..... **378/62; 378/98.11; 378/94**

(58) **Field of Search** ..... **378/5, 62, 98.9,  
378/98.11, 98.12, 901**

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,497,062 A \* 1/1985 Mistretta et al. .... 378/158  
4,542,459 A \* 9/1985 Riederer ..... 600/431  
6,205,348 B1 3/2001 Giger et al. .... 600/407

\* cited by examiner

*Primary Examiner*—David V. Bruce

(74) *Attorney, Agent, or Firm*—Fletcher Yoder

(57) **ABSTRACT**

The present technique provides a variety of processing schemes for decomposing soft tissue and bone images more accurately from low and high-energy images acquired from an imaging system, such as a dual-energy digital radiography system using flat-panel technology. In particular, a modified decomposition process is provided to mitigate noise and to reduce contrast artifacts, such as blooming, while decomposing soft tissue and bone images from low and high-energy images.

**45 Claims, 12 Drawing Sheets**

